The Theory of Successful Intelligence

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Abstract

This article presents a theory of successful intelligence. The theory is substantially broader than conventional theories of intelligence. It defines intelligence in terms of the ability to achieve one's goals in life, within one's sociocultural context. The article is divided into four major parts. The article opens with a consideration of the nature of intelligence. Then it discusses measurement of intelligence. Next it discusses how people can be intelligent but foolish. Finally it draws conclusions.
Keywords: Successful inteligence; analytical intelligence; creative intelligence; pratical intelligence.

La Teoría de Inteligencia Exitosa

Compendio

Este artículo presenta una teoría de Inteligencia exitosa. La teoría es substancialmente más ancha que la teorías convencionales de inteligencia. Define inteligencia por lo que se refiere a la habilidad de lograr las metas de uno en la via, dentro del contexto sociocultural de uno. El artículo es dividido en cuatro partes. El artículo abre con una consideración de la naturaleza de inteligencia. Entonces discute una medida de inteligencia. Luego discute cómo las personas pueden ser inteligentes pero ingenuas. Finalmente, dibuja las conclusiones.
Palabras-clave: Inteligencia exitosa; inteligencia analítica; inteligencia criativa; inteligencia prática.

Conventional views of intelligence favor individuals who are strong in memory and analytical abilities (e.g., Carroll, 1993; Cattell, 1971; Jensen, 1998). They disfavor most other individuals. The result is that individuals who may have the talents to succeed in life may be labeled as *unintelligent*, whereas some of those labeled as *intelligent* may be less endowed with such talents. This article presents a broader theory of intelligence that is more encompassing, but that is nevertheless rigorously validated. The theory is the theory of successful intelligence (Sternberg, 1997).

The history of the theory presented here has been documented, to some extent, in two earlier theoretical articles (Sternberg, 1980b, 1984). In the first article (Sternberg, 1980b) a theory of components of intelligence was presented. The article made the argument arguing that intelligence could be understood in terms of a set of elementary information-processing components that contributed to people's intelligence and individual differences in it. In the second article (Sternberg, 1984) the theory was expanded to include not just the analytical aspect of intelligence, which had been the emphasis of the earlier article, but the creative and practical aspects of intelligence as well.

The Nature of Intelligence

There are many definitions of intelligence, although intelligence is typically defined in terms of a person's ability to adapt to the environment and to learn from experience (Sternberg & Detterman, 1986). The definition of intelligence

here is somewhat more elaborate and is based on my (Sternberg, 1997, 1998a, 1999c) theory of successful intelligence. According to this definition: (Successful) intelligence is: 1) the ability to achieve one's goals in life, given one's sociocultural context; 2) by capitalizing on strengths and correcting or compensating for weaknesses; 3) in order to adapt to, shape, and select environments; and, 4) through a combination of analytical, creative, and practical abilities.

Consider first Item 1. Intelligence involves formulating a meaningful and coherent set of goals, and having the skills and dispositions to reach those goals. One individual may wish to be a statesperson, another, a scientist, and still another, an artist. Others may decide on careers in athletics, plumbing, politics, acting, or whatever. The question typically is not so much what goals individuals have chosen, but rather, what the individuals have done so that they can realize those goals in a meaningful way. Thus, this item actually includes three sub-items: a) identifying meaningful goals; b) coordinating those goals in a meaningful way so that they form a coherent story of what one is seeking in life; and, c) moving a substantial distance along the path toward reaching those goals.

This first item recognizes that "intelligence" means a somewhat different thing to each individual. The individual who wishes to become a Supreme Court judge will be taking a different path from the individual who wishes to become a distinguished novelist — but both will have formulated a set of coherent goals toward which to work. An evaluation of intelligence should focus not on what goal is chosen but rather on whether the individual has chosen a worthwhile set of goals and shown the skills and dispositions needed to achieve them.

Item 2 recognizes that although psychologists sometimes talk of a "general" factor of intelligence (Jensen, 1998; Spearman, 1927; see essays in Sternberg, 2000; Sternberg & Grigorenko, 2002b), really, virtually no one is good at

everything or bad at everything. People who are the positive intellectual leaders of society have identified their strengths and weaknesses, and have found ways to work effectively within that pattern of abilities.

There is no single way to succeed in a job that works for everyone. For example, some lawyers are successful by virtue of their very strong analytical skills. They may never argue in a courtroom, but they can put together an airtight legal argument. Another lawyer may have a commanding presence in the courtroom, but be less powerful analytically. The legal profession in the United Kingdom recognizes this distinction by having separate roles for the solicitor and the barrister. In the United States, successful lawyers find different specializations that allow them to make the best use of their talents. Unsuccessful lawyers may actually attempt to capitalize on weaknesses, for example, litigating cases when their legal talent lies elsewhere.

This same general principle applies in any profession. Consider, for example, teaching. Educators often try to distinguish characteristics of expert teachers (see Sternberg & Williams, 2001), and indeed, they have distinguished some such characteristics. But the truth is that teachers can excel in many different ways. Some teachers are better in giving large lectures; others in small seminars; others in one-on-one mentoring. There is no one formula that works for every teacher. Good teachers figure out their strengths and try to arrange their teaching so that they can capitalize on their strengths and at the same time either compensate for or correct their weaknesses. Team teaching is one way of doing so, in that one teacher can compensate for what the other does not do well.

Item 3 recognizes that intelligence broadly defined refers to more than just "adapting to the environment," which is the mainstay of conventional definitions of intelligence. The theory of successful intelligence distinguishes among adapting, shaping, and selecting.

In adaptation to the environment, one modifies oneself to fit an environment. The ability to adapt to the environment is important in life, and is especially important to individuals entering a new program. Most of them will be entering a new environment that is quite different from the one in which they previously have spent time. If they are not adaptable, they may not be able to transfer the skills they showed in the previous environment to the new one. Over the course of a life-time, environmental conditions change greatly. A kind of work that at one point in time may be greatly valued (e.g., forming a start-up company) may, at another point in time, be valued little if at all. In research, the problems change, and sometimes, people who were effective in solving the problems of one decade are relatively ineffective in solving the problems of another decade. In governmental leadership, some elected leaders prove to be dinosaurs — people who were able to lead the country effectively under one set of conditions but not under another set of conditions (such as when the national or world economy

tanks). Clearly, adaptability is a key skill in any definition of intelligence. An intellectual leader ought to be able to show the ability to adapt to a variety of environments.

In life, adaptation is not enough, however. Adaptation needs to be balanced with shaping. In shaping, one modifies the environment to fit what one seeks of it, rather than modifying oneself to fit the environment. Truly great people in any field are not just adaptors; they are also shapers. They recognize that they cannot change everything, but that if they want to have an impact on the world, they have to change some things. Part of successful intelligence is deciding what to change, and then how to change it.

When an individual enters an institution, one hopes that the individual will not only adapt to the environment, but shape it in a way that makes it a better place than it was before. Selection committees will wish to look for evidence not just of a candidate's engagement in a variety of activities, but also, of the individual's having made a difference in his or her involvement in those activities. Shaping is how one has this kind of impact (see Sternberg, 2003a).

Sometimes, one attempts unsuccessfully to adapt to an environment and then also fails in shaping that environment. No matter what one does to try to make the environment work out, nothing in fact seems to work. In such cases, the appropriate action may be to select another environment.

Many of the greatest people in any one field are people who started off in another field and found that the first field was not really the one in which they had the most to contribute. Rather than spend their lives doing something that turned out not to match their pattern of strengths and weaknesses, they had the sense to find something else to do where they really had a contribution to make.

Item 4 points out that successful intelligence involves a broader range of abilities than is typically measured by tests of intellectual and academic skills. Most of these tests measure primarily or exclusively memory and analytical abilities. With regard to memory, they assess the abilities to recall and recognize information. With regard to analytical abilities, they measure the skills involved when one analyzes, compares and contrasts, evaluates, critiques, and judges. These are important skills during the school years and in later life. But they are not the only skills that matter for school and life success. One needs not only to remember and analyze concepts; also one needs to be able to generate and apply them. Memory pervades analytic, creative, and practical thinking, and is necessary for their execution; but it is far from sufficient.

According to the proposed theory of human intelligence and its development (Sternberg, 1980b, 1984, 1985, 1990, 1997, 1999a, 2003b, 2004), a common set of processes underlies all aspects of intelligence. These processes are hypothesized to be universal. For example, although the solutions to problems that are considered intelligent in one culture may be different from the solutions considered to be intelligent in another culture, the need to define problems and

translate strategies to solve these problems exists in any culture.

Metacomponents, or executive processes, plan what to do, monitor things as they are being done, and evaluate things after they are done. Examples of metacomponents are recognizing the existence of a problem, defining the nature of the problem, deciding on a strategy for solving the problem, monitoring the solution of the problem, and evaluating the solution after the problem is solved.

Performance components execute the instructions of the metacomponents. For example, inference is used to decide how two stimuli are related and application is used to apply what one has inferred (Sternberg, 1977). Other examples of performance components are comparison of stimuli, justification of a given response as adequate although not ideal, and actually making the response.

Knowledge-acquisition components are used to learn how to solve problems or simply to acquire declarative knowledge in the first place (Sternberg, 1985). Selective encoding is used to decide what information is relevant in the context of one's learning. Selective comparison is used to bring old information to bear on new problems. And selective combination is used to put together the selectively encoded and compared information into a single and sometimes insightful solution to a problem.

Although the same processes are used for all three aspects of intelligence universally, these processes are applied to different kinds of tasks and situations depending on whether a given problem requires analytical thinking, creative thinking, practical thinking, or a combination of these kinds of thinking. In particular, analytical thinking is invoked when components are applied to fairly familiar kinds of problems abstracted from everyday life. Creative thinking is invoked when the components are applied to relatively novel kinds of tasks or situations. Practical thinking is invoked when the components are applied to experience to adapt to, shape, and select environments. One needs creative skills and dispositions to generate ideas, analytical skills and dispositions to decide if they are good ideas, and practical skills and dispositions to implement one's ideas and to convince others of their worth (Sternberg, 1999b).

More details regarding the theory can be found in Sternberg (1984, 1985, 1997). Because the theory of successful intelligence comprises three subtheories — a componential subtheory dealing with the components of intelligence, an experiential subtheory dealing with the importance of coping with relative novelty and of automatization of information processing, and a contextual subtheory dealing with processes of adaptation, shaping, and selection, the theory has been referred to from time to time as *triarchic.*

Intelligence is not, as Edwin Boring (1923) once suggested, merely what intelligence tests test. Intelligence tests and other tests of cognitive and academic skills measure part of the range of intellectual skills. They do not measure the whole range. One should not conclude that a person who does not test well

is not smart. Rather, one should merely look at test scores as one indicator among many of a person's intellectual skills.

The Assessment of Intelligence

Our assessments of intelligence have been organized around the analytical, creative, and practical aspects of it. We discuss those assessments here.

Analytical Intelligence

Analytical intelligence is involved when the information-processing components of intelligence are applied to analyze, evaluate, judge, or compare and contrast. It typically is involved when components are applied to relatively familiar kinds of problems where the judgments to be made are of a fairly abstract nature.

In some early work, it was shown how analytical kinds of problems, such as analogies or syllogisms, can be analyzed componentially (Guyote & Sternberg, 1981; Sternberg, 1977, 1980b, 1983; Sternberg & Gardner, 1983; Sternberg & Turner, 1981), with response times or error rates decomposed to yield their underlying information-processing components. The goal of this research was to understand the information-processing origins of individual differences in (the analytical aspect of) human intelligence. With componential analysis, one could specify sources of individual differences underlying a factor score such as that for "inductive reasoning." For example, response times on analogies (Sternberg, 1977) and linear syllogisms (Sternberg, 1980a) were decomposed into their elementary performance components. The general strategy of such research is to: a) specify an information-processing model of task performance; b) propose a parameterization of this model, so that each information-processing component is assigned a mathematical parameter corresponding to its latency (and another corresponding to its error rate); and, c) construct cognitive tasks administered in such a way that it is possible through mathematical modeling to isolate the parameters of the mathematical model. In this way, it is possible to specify, in the solving of various kinds of problems, several sources of important individual or developmental differences: 1) What performance components are used? 2) How long does it takes to execute each component? 3) How susceptible is each component to error? 4) How are the components combined into strategies? 5) What are the mental representations upon which the components act?

As an example, through componential analysis, it was possible to decompose inductive-reasoning performance into a set of underlying information-processing components. The analogy $A : B : C : D1, D2, D3, D4$ will be used as an example to illustrate the components. These components are: 1) *encoding*, the amount of time needed to register each stimulus ($A, B, C, D1, D2, D3, D4$); 2) *inference*, the amount of time needed to discern the basic relation between given stimuli (A to B); 3) *mapping*, the amount of time needed to transfer the relation from one set of stimuli to another (needed in analogical

reasoning) (*A to C*); 4) *application,* the amount of time needed to apply the relation as inferred (and sometimes as mapped) to a new set of stimuli (*A to B to C to ?*); 5) *comparison,* the amount of time needed to compare the validity of the response options (*D1, D2, D3, D4*); 6) *justification,* the amount of time needed to justify one answer as the best of the bunch (e.g., *D1*); and 7) *preparation-response,* the amount of time needed to prepare for problems solution and to respond.

Studies of reasoning need not use artificial formats. In a more recent study, and a colleague and I looked at predictions for everyday kinds of situations, such as when milk will spoil (Sternberg & Kalmar, 1997). In this study, the investigators looked at both predictions and postdictions (hypotheses about the past where information about the past is unknown) and found that postdictions took longer to make than did predictions.

Research on the components of human intelligence yielded some interesting results. Consider some examples. First, execution of early components (e.g., inference and mapping) tends exhaustively to consider the attributes of the stimuli, whereas execution of later components (e.g., application) tends to consider the attributes of the stimuli in self-terminating fashion, with only those attributes processed that are essential for reaching a solution (Sternberg, 1977). Second, in a study of the development of figural analogical reasoning, it was found that although children generally became quicker in information processing with age, not all components were executed more rapidly with age (Sternberg & Rifkin, 1979). The encoding component first showed a decrease in component time with age and then an increase. Apparently, older children realized that their best strategy was to spend more time in encoding the terms of a problem so that they later would be able to spend less time in operating on these encodings. A related, third finding was that better reasoners tend to spend relatively more time than do poorer reasoners in global, up-front metacomponential planning, when they solve difficult reasoning problems. Poorer reasoners, on the other hand, tend to spend relatively more time in local planning (Sternberg, 1981). Presumably, the better reasoners recognize that it is better to invest more time up front so as to be able to process a problem more efficiently later on. Fourth, it also was found in a study of the development of verbal analogical reasoning that, as children grew older, their strategies shifted so that they relied on word association less and abstract relations more (Sternberg & Nigro, 1980).

Some of the componential studies concentrated on knowledge-acquisition components rather than performance components or metacomponents. For example, in one set of studies, the investigators were interested in sources of individual differences in vocabulary (Sternberg & Powell, 1983; Sternberg, Powell, & Kaye, 1983; see also Sternberg, 1987a, 1987b). We were not content just to view these as individual differences in declarative knowledge because we wanted to understand why it was that some people acquired this declarative knowledge and others did not. What we found is that there are

multiple sources of individual and developmental differences. The three main sources were in knowledge-acquisition components, use of context clues, and use of mediating variables. For example, in the sentence, "*The blen rises in the east and sets in the west,*" the knowledge-acquisition component of selective comparison is used to relate prior knowledge about a known concept, the sun, to the unknown word (neologism) in the sentence, "*blen.*" Several context cues appear in the sentence, such as the fact that a blen rises, the fact that it sets, and the information about where it rises and sets. A mediating variable is that the information can occur after the presentation of the unknown word.

We did research such as that described above because they believed that conventional psychometric research sometimes incorrectly attributed individual and developmental differences. For example, a verbal analogies test that might appear on its surface to measure verbal reasoning might in fact measure primarily vocabulary and general information (Sternberg, 1977). In fact, in some populations, reasoning might hardly be a source of individual or developmental differences at all. And if researchers then look at the sources of the individual differences in vocabulary, they would need to understand that the differences in knowledge did not come from nowhere: Some children had much more frequent and better opportunities to learn word meanings than did others.

In the componential-analysis work described above, correlations were computed between component scores of individuals and scores on tests of different kinds of psychometric abilities. First, in the studies of inductive reasoning (Sternberg, 1977; Sternberg & Gardner, 1982, 1983), it was found that although inference, mapping, application, comparison, and justification tended to correlate with such tests, the highest correlation typically was with the preparation-response component. This result was puzzling at first, because this component was estimated as the regression constant in the predictive regression equation. This result ended up giving birth to the concept of the metacomponents: higher order processes used to plan, monitor, and evaluate task performance. It was also found, second, that the correlations obtained for all the components showed convergent-discriminant validation: They tended to be significant with psychometric tests of reasoning but not with psychometric tests of perceptual speed (Sternberg, 1977; Sternberg & Gardner, 1983). Moreover, third, significant correlations with vocabulary tended to be obtained only for encoding of verbal stimuli (Sternberg, 1977, Sternberg & Gardner, 1983). Fourth, it was found in studies of linear-syllogistic reasoning (e.g., *John is taller than Mary; Mary is taller than Susan; who is tallest?*) that components of the proposed (mixed linguistic-spatial) model that were supposed to correlate with verbal ability did so and did not correlate with spatial ability; components that were supposed to correlate with spatial ability did so and did not correlate with verbal ability. In other words, it was possible successfully to validate the proposed model of line-

ar-syllogistic reasoning not only in terms of the fit of response-time or error data to the predictions of the alternative models, but also in terms of the correlations of component scores with psychometric tests of verbal and spatial abilities (Sternberg, 1980a). Fifth and finally, it was found that there were individual differences in strategies in solving linear syllogisms, whereby some people used a largely linguistic model, others a largely spatial model, and most the proposed linguistic-spatial mixed model. Thus, sometimes, less than perfect fit of a proposed model to group data may reflect individual differences in strategies among participants.

Creative Intelligence

Intelligence tests contain a range of problems, some of them more novel than others. In some of the componential work we have shown that when one goes beyond the range of unconventionality of the conventional tests of intelligence, one starts to tap sources of individual differences measured little or not at all by the tests. According to the theory of successful intelligence, (creative) intelligence is particularly well measured by problems assessing how well an individual can cope with relative novelty. Thus it is important to include in a battery of tests problems that are relatively novel in nature.

We presented 80 individuals with novel kinds of reasoning problems that had a single best answer. For example, they might be told that some objects are green and others blue; but still other objects might be grue, meaning green until the year 2000 and blue thereafter, or bleen, meaning blue until the year 2000 and green thereafter. Or they might be told of four kinds of people on the planet Kyron, *blens*, who are born young and die young; *kwefs*, who are born old and die old; *balts*, who are born young and die old; and *prosses*, who are born old and die young (Sternberg, 1982; Tetewsky & Sternberg, 1986). Their task was to predict future states from past states, given incomplete information. In another set of studies, 60 people were given more conventional kinds of inductive reasoning problems, such as analogies, series completions, and classifications, but were told to solve them. But the problems had premises preceding them that were either conventional (dancers wear shoes) or novel (dancers eat shoes). The participants had to solve the problems as though the counterfactuals were true (Sternberg & Gastel, 1989a, 1989b).

In these studies, we found that correlations with conventional kinds of tests depended on how novel or nonentrenched the conventional tests were. The more novel are the items, the higher are the correlations of our tests with scores on successively more novel conventional tests. Thus, the components isolated for relatively novel items would tend to correlate more highly with more unusual tests of fluid abilities (e.g., that of Cattell & Cattell, 1973) than with tests of crystallized abilities. We also found that when response times on the relatively novel problems were componentially analyzed, some components better measured the creative aspect of intelligence than did others. For example, in the *grue-*

bleen task mentioned above, the information-processing component requiring people to switch from conventional *green-blue* thinking to *grue-bleen* thinking and then back to *green-blue* thinking again was a particularly good measure of the ability to cope with novelty.

Practical Intelligence

Practical intelligence involves individuals applying their abilities to the kinds of problems that confront them in daily life, such as on the job or in the home. Practical intelligence involves applying the components of intelligence to experience so as to: a) adapt to, b) shape, and, c) select environments. Adaptation is involved when one changes oneself to suit the environment. Shaping is involved when one changes the environment to suit oneself. And selection is involved when one decides to seek out another environment that is a better match to one's needs, abilities, and desires. People differ in their balance of adaptation, shaping, and selection, and in the competence with which they balance among the three possible courses of action.

Much of our work on practical intelligence has centered on the concept of tacit knowledge. We have defined this construct as what one needs to know in order to work effectively in an environment that one is not explicitly taught and that often is not even verbalized (Sternberg et al., 2000; Sternberg & Wagner, 1993; Sternberg, Wagner, & Okagaki, 1993; Sternberg, Wagner, Williams, & Horvath, 1995; Wagner, 1987; Wagner & Sternberg, 1986). We represent tacit knowledge in the form of production systems, or sequences of "if-then" statements that describe procedures one follows in various kinds of everyday situations.

We typically have measured tacit knowledge using work-related problems that present problems one might encounter on the job. We have measured tacit knowledge for both children and adults, and among adults, for people in over two dozen occupations, such as management, sales, academia, teaching, school administration, secretarial work, and the military. In a typical tacit-knowledge problem, people are asked to read a story about a problem someone faces and to rate, for each statement in a set of statements, how adequate a solution the statement represents. For example, in a paper-and-pencil measure of tacit knowledge for sales, one of the problems deals with sales of photocopy machines. A relatively inexpensive machine is not moving out of the show room and has become overstocked. The examinee is asked to rate the quality of various solutions for moving the particular model out of the show room. In a performance-based measure for sales people, the test-taker makes a phone call to a supposed customer, who is actually the examiner. The test-taker tries to sell advertising space over the phone. The examiner raises various objections to buying the advertising space. The test-taker is evaluated for the quality, rapidity, and fluency of the responses on the telephone.

In the tacit-knowledge studies, we have found, first, that practical intelligence as embodied in tacit knowledge increases

with experience, but it is profiting from experience, rather than experience per se, that results in increases in scores. Some people can have been in a job for years and still have acquired relatively little tacit knowledge. Second, we also have found that subscores on tests of tacit knowledge — such as for managing oneself, managing others, and managing tasks — correlate significantly with each other. Third, scores on various tests of tacit knowledge, such as for academics and managers, are also correlated fairly substantially (at about the .5 level) with each other. Thus, fourth, tests of tacit knowledge may yield a general factor across these tests. However, fifth, scores on tacit-knowledge tests do not correlate with scores on conventional tests of intelligence, whether the measures used are single-score measures of multiple-ability batteries. Thus, any general factor from the tacit-knowledge tests is not the same as any general factor from tests of academic abilities (suggesting that neither kind of g factor is truly general, but rather, general only across a limited range of measuring instruments). Sixth, despite the lack of correlation of practical-intellectual with conventional measures, the scores on tacit-knowledge tests predict performance on the job as well as or better than do conventional psychometric intelligence tests. In one study done at the Center for Creative Leadership, we further found, seventh, that scores on our tests of tacit knowledge for management were the best single predictor of performance on a managerial simulation. In a hierarchical regression, scores on conventional tests of intelligence, personality, styles, and interpersonal orientation were entered first and scores on the test of tacit knowledge were entered last. Scores on the test of tacit knowledge were the single best predictor of managerial simulation score. Moreover, these scores also contributed significantly to the prediction even after everything else was entered first into the equation. In recent work on military leadership (Hedlund et al., 2003; Sternberg et al., 2000; Sternberg & Hedlund, 2002), it was found, eighth, that scores of 562 participants on tests of tacit knowledge for military leadership predicted ratings of leadership effectiveness, whereas scores on a conventional test of intelligence and on a tacit-knowledge test for managers did not significantly predict the ratings of effectiveness.

We also have done studies of social intelligence, which is viewed in the theory of successful intelligence as a part of practical intelligence. In these studies, 40 individuals were presented with photos and were asked either to make judgments about the photos. In one kind of photo, they were asked to evaluate whether a male-female couple was a genuine couple (i.e., really involved in a romantic relationship) or a phony couple posed by the experimenters. In another kind of photo, they were asked to indicate which of two individuals was the other's supervisor (Barnes & Sternberg, 1989; Sternberg & Smith, 1985). We found females to be superior to males on these tasks. Scores on the two tasks did not correlate with scores on conventional ability tests, nor did they correlate with each other, suggesting a substantial degree of domain specificity in the task.

Even stronger results have been obtained overseas. In a study in Usenge, Kenya, near the town of Kisumu, we were interested in school-age children's ability to adapt to their indigenous environment. We devised a test of practical intelligence for adaptation to the environment (see Sternberg & Grigorenko, 1997; Sternberg, Nokes, Geissler, Prince, Okatcha, Bundy, et al., 2001). The test of practical intelligence measured children's informal tacit knowledge for natural herbal medicines that the villagers believe can be used to fight various types of infections. At least some of these medicines appear to be effective and most villagers certainly believe in their efficacy, as shown by the fact that children in the villages use their knowledge of these medicines an average of once a week in medicating themselves and others. Thus, tests of how to use these medicines constitute effective measures of one aspect of practical intelligence as defined by the villagers as well as their life circumstances in their environmental contexts. Middle-class Westerners might find it quite a challenge to thrive or even survive in these contexts, or, for that matter, in the contexts of urban ghettos often not distant from their comfortable homes.

We measured the Kenyan children's ability to identify the medicines, where they come from, what they are used for, and how they are dosed. Based on work we had done elsewhere, they expected that scores on this test would not correlate with scores on conventional tests of intelligence. In order to test this hypothesis, we also administered to the 85 children the Raven Coloured Progressive Matrices Test, which is a measure of fluid or abstract-reasoning-based abilities, as well as the Mill Hill Vocabulary Scale, which is a measure of crystallized or formal-knowledge-based abilities. In addition, they gave the children a comparable test of vocabulary in their own Dholuo language. The Dholuo language is spoken in the home, English in the schools.

We did indeed find no correlation between the test of indigenous tacit knowledge and scores on the fluid-ability tests. But to our surprise, we found statistically significant correlations of the tacit-knowledge tests with the tests of crystallized abilities. The correlations, however, were *negative*. In other words, the higher the children scored on the test of tacit knowledge, the lower they scored, on average, on the tests of crystallized abilities. This surprising result can be interpreted in various ways, but based on the ethnographic observations of the anthropologists on the team, Geissler and Prince, the researchers concluded that a plausible scenario takes into account the expectations of families for their children.

Many children drop out of school before graduation, for financial or other reasons, and many families in the village do not particularly value formal Western schooling. There is no reason they should, as the children of many families will for the most part spend their lives farming or engaged in other occupations that make little or no use of Western schooling. These families emphasize teaching their children the indigenous informal knowledge that will lead to successful adaptation in

the environments in which they will really live. Children who spend their time learning the indigenous practical knowledge of the community generally do not invest themselves heavily in doing well in school, whereas children who do well in school generally do not invest themselves as heavily in learning the indigenous knowledge — hence the negative correlations.

The Kenya study suggests that the identification of a general factor of human intelligence may tell us more about how abilities interact with patterns of schooling and especially Western patterns of schooling than it does about the structure of human abilities. In Western schooling, children typically study a variety of subject matters from an early age and thus develop skills in a variety of skill areas. This kind of schooling prepares the children to take a test of intelligence, which typically measures skills in a variety of areas. Often intelligence tests measure skills that children were expected to acquire a few years before taking the intelligence test. But as Rogoff (1990) and others have noted, this pattern of schooling is not universal and has not even been common for much of the history of humankind. Throughout history and in many places still, schooling, especially for boys, takes the form of apprenticeships in which children learn a craft from an early age. They learn what they will need to know in order to succeed in a trade, but not a lot more. They are not simultaneously engaged in tasks that require the development of the particular blend of skills measured by conventional intelligence tests. Hence it is less likely that one would observe a general factor in their scores, much as the investigators discovered in Kenya. Some years back, Vernon (1971) pointed out that the axes of a factor analysis do not necessarily reveal a latent structure of the mind but rather represent a convenient way of characterizing the organization of mental abilities. Vernon believed that there was no one "right" orientation of axes, and indeed, mathematically, an infinite number of orientations of axes can be fit to any solution in an exploratory factor analysis. Vernon's point seems perhaps to have been forgotten or at least ignored by later theorists.

We have considered each of the aspects of intelligence separately. How do they fare when they are assessed together?

All Three Aspects of Intelligence Together
Factor-Analytic Studies

Several separate factor-analytic studies support the internal validity of the theory of successful intelligence.

In one study (Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999), we used the so-called Sternberg Triarchic Abilities Test (STAT — Sternberg, 1993) to investigate the internal validity of the theory. Three hundred twenty-six high school students, primarily from diverse parts of the United States, took the test, which comprised 12 subtests in all. There were four subtests each measuring analytical, creative, and practical abilities. For each type of ability, there were three multiple-choice tests and one essay test. The multiple-choice tests, in turn, involved, respectively, verbal, quantitative, and figural content. Consider the content of each test. 1) Analytical-Verbal: Figuring out meanings of neologisms (artificial words) from natural contexts. Students see a novel word embedded in a paragraph, and have to infer its meaning from the context. 2) Analytical-Quantitative: Number series. Students have to say what number should come next in a series of numbers. 3) Analytical-Figural: Matrices. Students see a figural matrix with the lower right entry missing. They have to say which of the options fits into the missing space. 4) Practical-Verbal: Everyday reasoning. Students are presented with a set of everyday problems in the life of an adolescent and have to select the option that best solves each problem. 5) Practical-Quantitative: Everyday math. Students are presented with scenarios requiring the use of math in everyday life (e.g., buying tickets for a ballgame), and have to solve math problems based on the scenarios. 6) Practical-Figural: Route planning. Students are presented with a map of an area (e.g., an entertainment park) and have to answer questions about navigating effectively through the area depicted by the map. 7) Creative-Verbal: Novel analogies. Students are presented with verbal analogies preceded by counterfactual premises (e.g., money falls off trees). They have to solve the analogies as though the counterfactual premises were true. 8) Creative-Quantitative: Novel number operations. Students are presented with rules for novel number operations, for example, *flix*, which involves numerical manipulations that differ as a function of whether the first of two operands is greater than, equal to, or less than the second. Participants have to use the novel number operations to solve presented math problems. 9) Creative-Figural: In each item, participants are first presented with a figural series that involves one or more transformations; they then have to apply the rule of the series to a new figure with a different appearance, and complete the new series. 10) Analytical-Essay: This essay requires students to analyze the use of security guards in high schools: What are the advantages and disadvantages and how can these be weighed to make a recommendation? 11) Practical-Essay: Give three practical solutions to a problem you are currently having in your life. 12) Creative-Essay: Describe the ideal school.

Confirmatory factor analysis on the data was supportive of the triarchic theory of human intelligence, yielding separate and uncorrelated analytical, creative, and practical factors. The lack of correlation was due to the inclusion of essay as well as multiple-choice subtests. Although multiple-choice tests tended to correlate substantially with multiple-choice tests, their correlations with essay tests were much weaker. The multiple-choice analytical subtest loaded most highly on the analytical factor, but the essay creative and practical subtests loaded most highly on their respective factors. Thus, measurement of creative and practical abilities probably ideally should be accomplished with other kinds of testing instruments that complement multiple-choice instruments.

In another study, conducted with 3252 students in the U.S. Finland, and Spain, we used the multiple-choice section of that

STAT to compare five alternative models of intelligence, again via confirmatory factor analysis. A model featuring a general factor of intelligence fit the data relatively poorly. The triarchic model, allowing for intercorrelation among the analytic, creative, and practical factors, provided the best fit to the data (Sternberg, Castejón, Prieto, Hautakami, & Grigorenko, 2001).

In a further study, we (Grigorenko & Sternberg, 2001) tested 511 Russian school children (ranging in age from 8 to 17 years) as well as 490 mothers and 328 fathers of these children. They used entirely distinct measures of analytical, creative, and practical intelligence. Consider, for example, the tests used for adults. Similar tests were used for children.

Fluid analytical intelligence was measured by two subtests of a test of nonverbal intelligence. The *Test of g: Culture Fair, Level II* (Cattell & Cattell, 1973) is a test of fluid intelligence designed to reduce, as much as possible, the influence of verbal comprehension, culture, and educational level, although no test eliminates such influences. In the first subtest, *Series,* individuals were presented with an incomplete, progressive series of figures. The participants' task was to select, from among the choices provided, the answer that best continued the series. In the *Matrices* subtest, the task was to complete the matrix presented at the left of each row.

The test of crystallized intelligence was adapted from existing traditional tests of analogies and synonyms/antonyms used in Russia. We used adaptations of Russian rather than American tests because the vocabulary used in Russia differs from that used in the USA. The first part of the test included 20 verbal analogies (KR20 = 0.83). An example is *circle—ball = square—? (a) quadrangular, (b) figure, (c) rectangular, (d) solid, (e) cube.* The second part included 30 pairs of words, and the participants' task was to specify whether the words in the pair were synonyms or antonyms (KR20 = 0.74). Examples are *latent-hidden,* and *systematic-chaotic.*

The measure of creative intelligence also comprised two parts. The first part asked the participants to describe the world through the eyes of insects. The second part asked participants to describe who might live and what might happen on a planet called *Priumliava.* No additional information on the nature of the planet was specified. Each part of the test was scored in three different ways to yield three different scores. The first score was for originality (novelty); the second was for the amount of development in the plot (quality); and the third was for creative use of prior knowledge in these relatively novel kinds of tasks (sophistication). The measure of practical intelligence was self-report and also comprised two parts. The first part was designed as a 20-item, self-report instrument, assessing practical skills in the social domain (e.g., effective and successful communication with other people), in the family domain (e.g., how to fix household items, how to run the family budget), and in the domain of effective resolution of sudden problems (e.g., organizing something that has become chaotic). The second part had 4 vignettes, based on themes that appeared in popular Russian magazines in the context of discussion of adaptive skills in the current society. The four themes were,

respectively, how to maintain the value of one's savings, what to do when one makes a purchase and discovers that the item one has purchased is broken, how to locate medical assistance in a time of need, and how to manage a salary bonus one has received for outstanding work. Each vignette was accompanied by five choices and participants had to select the best one. Obviously, there is no one "right" answer in this type of situation. Hence Grigorenko and Sternberg used the most frequently chosen response as the keyed answer. To the extent that this response was suboptimal, this suboptimality would work against the researchers in subsequent analyses relating scores on this test to other predictor and criterion measures.

In this study, exploratory principal-component analysis for both children and adults yielded very similar factor structures. Both varimax and oblimin rotations yielded clearcut analytical, creative, and practical factors for the tests. Thus, with a sample of a different nationality (Russian), a different set of tests, and a different method of analysis (exploratory rather than confirmatory analysis) again supported the theory of successful intelligence.

The analytical, creative, and practical tests the investigators employed were used to predict mental and physical health among the Russian adults. Mental health was measured by widely used paper-and-pencil tests of depression and anxiety and physical health was measured by self-report. The best predictor of mental and physical health was the practical-intelligence measure. Analytical intelligence came second and creative intelligence came third. All three contributed to prediction, however. Thus, the researchers again concluded that a theory of intelligence encompassing all three elements provides better prediction of success in life than does a theory comprising just the analytical element.

In a recent study supported by the College Board (Sternberg & the Rainbow Project Team, 2002), we used an expanded set of tests on 1015 students at 15 different institutions (13 colleges and 2 high schools). Our goal was not to replace the SAT, but to devise tests that would supplement the SAT, measuring skills that this test does not measure. In addition to the multiple-choice STAT tests described earlier, we used 3 additional measures of creative skills and 3 of practical skills:

Creative skills. The three additional tests were as follows:

1. *Cartoons*: Participants were given five cartoons purchased from the archives of the *New Yorker,* but with the caption removed. The participant's task was to choose three cartoons, and to provide a caption for each cartoon. Two trained judges rated all the cartoons for cleverness, humor, and originality. A combined creativity score was formed by summing the individual ratings on each dimension.

2. *Written Stories:* Participants were asked to write two stories, spending about 15 minutes on each, choosing from the following titles: *A Fifth Chance*, *2983*, *Beyond the Edge*, *The Octopus's Sneakers*, *It's Moving Backwards*, and *Not Enough Time*. A team of four judges was trained to rate the stories for originality, complexity, emotional evocativeness, and descriptiveness. These stories were based on work originally

done to measure creativity (Sternberg & Lubart, 1995), which is described further below.

3. *Oral Stories*: Participants were presented with five sheets of paper, each containing a set of pictures linked by a common theme. For example, participants might receive a sheet of paper with images of a musical theme, a money theme, or a travel theme. The participant then chose one of the pages and was given 15 minutes to formulate a short story and dictate it into a cassette recorder. The dictation period was not to be more than five minutes long. The process was then repeated with another sheet of images so that each participant dictated a total of two oral stories. Six judges were trained to rate the stories for originality, complexity, emotional evocativeness, and descriptiveness.

Practical skills. The three additional tests were as follows:

1. *Everyday Situational Judgment Inventory (Movies).* This video-based inventory presents participants with seven brief vignettes that capture problems encountered in general, everyday life, such as determining what to do when one is asked to write a letter of recommendation for someone one does not know particularly well.

2. *Common Sense Questionnaire.* This written inventory presents participants with 15 vignettes that capture problems encountered in general business-related situations, such as managing tedious tasks or handling a competitive work situation.

3. *College Life Questionnaire.* This written inventory presents participants with 15 vignettes that capture problems encountered in general college-related situations, such as handling trips to the bursar's office or dealing with a difficult roommate.

We found that our tests significantly and substantially improved upon the validity of the SAT for predicting first-year college grades (Sternberg & the Rainbow Project **Collaborators**, 2005; Sternberg, The Rainbow Project Collaborators, & University of Michigan Business School Project Collaborators, 2004). The test also improved equity: Using the test to admit a class would result in greater ethnic diversity than would using just the SAT or just the SAT and grade-point average. This test is now going into Phase-2 piloting, where it will be tried out on a larger sample of individuals.

Instructional Studies

Instructional studies are a further means of testing the theory. We have used instruction both in cognitive skills, in general, and in academic skills, in particular.

Cognitive skills. The kinds of analytical, creative, and practical abilities discussed in this essay are not fixed, but rather, modifiable. We have developed ways of modifying all there kinds of abilities. Analytical skills can be taught. For example, in one study, I (Sternberg, 1987a) tested whether it is possible to teach people better to decontextualize meanings of unknown words presented in context. In one study, I gave 81 participants in five conditions a pretest on their ability to decontextualize word meanings. Then the participants were divided into five conditions, two of which were control conditions that lacked

formal instruction. In one condition, participants were not given any instructional treatment. They were merely asked later to take a post-test. In a second condition, they were given practice as an instructional condition, but there was no formal instruction, per se. In a third condition, they were taught knowledge-acquisition component processes that could be used to decontextualize word meanings. In a fourth condition, they were taught to use context cues. In a fifth condition, they were taught to use mediating variables. Participants in all three of the theory-based formal-instructional conditions outperformed participants in the two control conditions, whose performance did not differ. In other words, theory-based instruction was better than no instruction at all or just practice without formal instruction.

Creative-thinking skills also can be taught and a program has been devised for teaching them (Sternberg & Williams, 1996; see also Sternberg & Grigorenko, 2000). In some relevant work, the investigators divided 86 gifted and nongifted fourth-grade children into experimental and control groups. All children took pretests on insightful thinking. Then some of the children received their regular school instruction whereas others received instruction on insight skills. After the instruction of whichever kind, all children took a post-test on insight skills. We found that children taught how to solve the insight problems using knowledge-acquisition components gained more from pretest to posttest than did students who were not so taught (Davidson & Sternberg, 1984).

Practical-intelligence skills also can be taught. We have developed a program for teaching practical intellectual skills, aimed at middle-school students, that explicitly teaches students "practical intelligence for school" in he contexts of doing homework, taking tests, reading, and writing (Gardner, Krechevsky, Sternberg, & Okagaki, 1994; Williams et al., 1996; Williams et al., 2002). We have evaluated the program in a variety of settings (Gardner et al., 1994; Sternberg, Okagaki, & Jackson, 1990) and found that students taught via the program outperform students in control groups that did not receive the instruction.

Individuals' use of practical intelligence can be to their own gain in addition to or instead of the gain of others. People can be practically intelligent for themselves at the expense of others. It is for this reason that wisdom needs to be studied in its own right in addition to practical or even successful intelligence (Baltes & Staudinger, 2000; Sternberg, 1998b).

In sum, practical intelligence, like analytical intelligence, is an important antecedent of life success. Because measures of practical intelligence predict everyday behavior at about the same level as do measures of analytical intelligence (and sometimes even better), the sophisticated use of such tests roughly could double the explained variance in various kinds of criteria of success. Using measures of creative intelligence as well might increase prediction still more. Thus, tests based on the construct of successful intelligence might take us to new and higher levels of prediction. At the same time, expansions of conventional tests that stay within the

conventional framework of analytical tests based on standard psychometric models do not seem likely greatly to expand our predictive capabilities (Schmidt & Hunter, 1998).

We view intelligence as a form of developing expertise (Sternberg, 1998a, 1999a, 2003a). Indeed, some of our tests may seem more like tests of achievement or of developing expertise (see Ericsson, 1996; Howe, Davidson, & Sloboda, 1998) than of intelligence. But it can be argued that intelligence is itself a form of developing expertise — that there is no clearcut distinction between the two constructs (Sternberg, 1998a, 1999a). Indeed, all measures of intelligence, one might argue, measure a form of developing expertise.

An example of how tests of intelligence measure developing expertise emanates from work we have done in Tanzania. A study done in Tanzania (see Sternberg & Grigorenko, 1997; Sternberg, Grigorenko, et al., 2002) points out the risks of giving tests, scoring them, and interpreting the results as measures of some latent intellectual ability or abilities. We administered to 358 school children between the ages of 11 and 13 years near Bagamoyo, Tanzania, tests including a form-board classification test, a linear syllogisms test, and a Twenty Questions Test, which measure the kinds of skills required on conventional tests of intelligence. Of course, we obtained scores that they could analyze and evaluate, ranking the children in terms of their supposed general or other abilities. However, we administered the tests dynamically rather than statically (Brown & Ferrara, 1985; Budoff, 1968; Day, Engelhardt, Maxwell, & Bolig, 1997; Feuerstein, 1979; Grigorenko & Sternberg, 1998; Guthke, 1993; Haywood & Tzuriel, 1992; Lidz, 1987, 1991; Sternberg & Grigorenko, 2002a; Tzuriel, 1995; Vygotsky, 1978). Dynamic testing is like conventional static testing in that individuals are tested and inferences about their abilities made. But dynamic tests differ in that children are given some kind of feedback in order to help them improve their scores. Vygotsky (1978) suggested that the children's ability to profit from the guided instruction the children received during the testing session could serve as a measure of children's zone of proximal development (ZPD), or the difference between their developed abilities and their latent capacities. In other words, testing and instruction are treated as being of one piece rather than as being distinct processes.

This integration makes sense in terms of traditional definitions of intelligence as the ability to learn (*Intelligence and Its Measurement*, 1921; Sternberg & Detterman, 1986). What a dynamic test does is directly measure processes of learning in the context of testing rather than measuring these processes indirectly as the product of past learning. Such measurement is especially important when not all children have had equal opportunities to learn in the past.

In our assessments, children were first given the ability tests. In an experimental group, they then were given a brief period of instruction in which they were able to learn skills that would potentially enable them to improve their scores. In a control group, they were not given this intervention. Then they were tested again. Because the instruction for each test lasted only about 5-10 minutes, one would not expect dramatic gains. Yet, on average, the gains were statistically significant in the experimental group, and statistically greater than in the control group. In the control group, pretest and posttest scores correlated at the .8 level. In the experimental group, however, scores on the pretest showed only weak although significant correlations with scores on the post-test. These correlations, at about the .3 level, suggested that when tests are administered statically to children in developing countries, they may be rather unstable and easily subject to influences of training. The reason could be that the children are not accustomed to taking Western-style tests, and so profit quickly even from small amounts of instruction as to what is expected from them. Of course, the more important question is not whether the scores changed or even correlated with each other, but rather how they correlated with other cognitive measures. In other words, which test was a better predictor of transfer to other cognitive performance, the pretest score or the post-test score? We found the post-test score to be the better predictor.

Academic skills. In a first set of studies, researchers explored the question of whether conventional education in school systematically discriminates against children with creative and practical strengths (Sternberg & Clinkenbeard, 1995; Sternberg, Ferrari, Clinkenbeard, & Grigorenko, 1996; Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999). Motivating this work was the belief that the systems in most schools strongly tend to favor children with strengths in memory and analytical abilities. However, schools can be unbalanced in other directions as well. One school Elena Grigorenko and I visited in Russia in 2000 placed a heavy emphasis upon the development of creative abilities — much more so than on the development of analytical and practical abilities. While on this trip, they were told of yet another school — catering to the children of Russian businessman — that strongly emphasized practical abilities, and in which children who were not practically oriented were told that, eventually, they would be working for their classmates who were practically oriented.

The investigators used the Sternberg Triarchic Abilities Test, as described above, in some of our instructional work. The test was administered to 326 children around the United States and in some other countries who were identified by their schools as gifted by any standard whatsoever. Children were selected for a summer program in (college-level) psychology if they fell into one of five ability groupings: high analytical, high creative, high practical, high balanced (high in all three abilities), or low balanced (low in all three abilities). Students who came to Yale were then divided into four instructional groups. Students in all four instructional groups used the same introductory-psychology textbook (a preliminary version of Sternberg, 1995) and listened to the same psychology lectures. What differed among them was the type of afternoon discussion section to which they were assigned. They were assigned to an instructional condition that emphasized either memory,

analytical, creative, or practical instruction. For example, in the memory condition, they might be asked to describe the main tenets of a major theory of depression. In the analytical condition, they might be asked to compare and contrast two theories of depression. In the creative condition, they might be asked to formulate their own theory of depression. In the practical condition, they might be asked how they could use what they had learned about depression to help a friend who was depressed.

Students in all four instructional conditions were evaluated in terms of their performance on homework, a midterm exam, a final exam, and an independent project. Each type of work was evaluated for memory, analytical, creative, and practical quality. Thus, all students were evaluated in exactly the same way.

Our results suggested the utility of the theory of successful intelligence. This utility showed itself in several ways.

First, we observed when the students arrived at Yale that the students in the high creative and high practical groups were much more diverse in terms of racial, ethnic, socioeconomic, and educational backgrounds than were the students in the high-analytical group, suggesting that correlations of measured intelligence with status variables such as these may be reduced by using a broader conception of intelligence. Thus, the kinds of students identified as strong differed in terms of populations from which they were drawn in comparison with students identified as strong solely by analytical measures. More importantly, just by expanding the range of abilities measured, the investigators discovered intellectual strengths that might not have been apparent through a conventional test.

Second, we found that all three ability tests — analytical, creative, and practical — significantly predicted course performance. When multiple-regression analysis was used, at least two of these ability measures contributed significantly to the prediction of each of the measures of achievement. Perhaps as a reflection of the difficulty of deemphasizing the analytical way of teaching, one of the significant predictors was always the analytical score. (However, in a replication of our study with low-income African-American students from New York, Deborah Coates of the City University of New York found a different pattern of results. Her data indicated that the practical tests were better predictors of course performance than were the analytical measures, suggesting that what ability test predicts what criterion depends on population as well as mode of teaching.)

Third and most importantly, there was an aptitude-treatment interaction whereby students who were placed in instructional conditions that better matched their pattern of abilities outperformed students who were mismatched. In other words, when students are taught in a way that fits how they think, they do better in school. Children with creative and practical abilities, who are almost never taught or assessed in a way that matches their pattern of abilities, may be at a disadvantage in course after course, year after year.

A follow-up study (Sternberg, Torff, & Grigorenko, 1998a, 1998b) examined learning of social studies and science by third-graders and eighth-graders. The 225 third-graders were students in a very low-income neighborhood in Raleigh, North Carolina. The 142 eighth-graders were students who were largely middle to upper-middle class studying in Baltimore, Maryland, and Fresno, California. In this study, students were assigned to one of three instructional conditions. In the first condition, they were taught the course that basically they would have learned had there been no intervention. The emphasis in the course was on memory. In a second condition, students were taught in a way that emphasized critical (analytical) thinking. In the third condition, they were taught in a way that emphasized analytical, creative, and practical thinking. All students' performance was assessed for memory learning (through multiple-choice assessments) as well as for analytical, creative, and practical learning (through performance assessments).

As expected, students in the successful-intelligence (analytical, creative, practical) condition outperformed the other students in terms of the performance assessments. One could argue that this result merely reflected the way they were taught. Nevertheless, the result suggested that teaching for these kinds of thinking succeeded. More important, however, was the result that children in the successful-intelligence condition outperformed the other children even on the multiple-choice memory tests. In other words, to the extent that one's goal is just to maximize children's memory for information, teaching for successful intelligence is still superior. It enables children to capitalize on their strengths and to correct or to compensate for their weaknesses, and it allows children to encode material in a variety of interesting ways.

We have now extended these results to reading curricula at the middle-school and the high-school level. In a study of 871 middle-school students and 432 high school students, we taught reading either triarchically or through the regular curriculum. At the middle-school level, reading was taught explicitly. At the high school level, reading was infused into instruction in mathematics, physical sciences, social sciences, English, history, foreign languages, and the arts. In all settings, students who were taught triarchically substantially outperformed students who were taught in standard ways (Grigorenko, Jarvin, & Sternberg, 2002).

Thus the results of three sets of studies suggest that the theory of successful intelligence is valid as a whole. Moreover, the results suggest that the theory can make a difference not only in laboratory tests, but in school classrooms and even the everyday life of adults as well. We can teach people to think intelligently, but some people are foolish nevertheless.

People Can Be Intelligent but Foolish

Some people are intelligent and creative, but foolish. That is they, are smart but not wise (Sternberg, 1998b). What are the characteristics of people who are smart, but foolish? Consider five characteristics, based on Sternberg (2002).

The first is *unrealistic optimism* with respect to the long-term consequences of what they do. They may believe themselves to be so smart that they believe that, whatever they do, it will work out all right. They may overly trust their own intuitions, believing that their brilliance means that they can do no wrong.

The second is *egocentrism*. Many smart people have been so highly rewarded in their lives that they lose sight of the interests of others. They start to act as though the whole world revolves around them. In doing so, they often set themselves up for downfalls, as happened to both Presidents Nixon and Clinton, the former in the case of Watergate, the latter in the case of *Monicagate*.

The third characteristic is a sense of *omniscience*. Smart people typically know a lot. They get in trouble, however, when they start to think they "know it all." They may have expertise in one area, but then, start to fancy themselves experts in practically everything. At that point, they become susceptible to remarkable downfalls, because they act as experts in areas where they are not, and can make disastrous mistakes in doing so.

The fourth characteristic is a sense of *omnipotence*. Many smart people find themselves in positions of substantial power. Sometimes they lose sight of the limitations of their power, and start to act as though they are omnipotent. Several U.S. presidents as well as presidents of other countries have had this problem, leading their countries to disasters on the basis of personal whims. Many corporate chieftains have also started to think of themselves as omnipotent, unfortunately, cooking the books of their corporations at will.

The fifth characteristic is a sense of *invulnerability*. Not only do the individuals think they can do anything; they also believe they can get away with it. They believe that either they are too smart to be found out or, even if found out, they will escape any punishment for misdeeds. The result is the kind of disasters the United States has seen in the recent Enron, Worldcom, and Arthur Andersen debacles.

Conclusions

Some psychologists will believe that the theory of successful intelligence departs too much from the conventional theory of general intelligence (Spearman, 1904): Some disagree with parts of the theory (e.g., Brody, 2003a, 2003b) and some disagree with the whole thing, vehemently (Gottfredson, 2003a, 2003b). Others believe the theory does not depart from conventional g theory enough (Gardner, 1983). Still others have theories that are more compatible, in spirit, with that proposed here, at least for intelligence (Ceci, 1996). The theory is rather newer than that of, say, Spearman (1904), and has much less work to support is, as well as a lesser range of empirical support. I doubt the theory is wholly correct — scientific theories so far have not been — but I hope at the same time it serves as a broader basis for future theories than, say, Spearman's theory of general intelligence. No doubt, there will be those who wish to preserve this and related older theories, and those who will continue to do research that replicates hundreds and thousands of time that so-called general intelligence does indeed matter for success in many aspects of life. I agree. At the same time, I suspect it is not sufficient, and also, that those who keep replicating endlessly the findings of the past are unlikely to serve as the positive intellectual leaders of the future. But only time will tell. As noted earlier, there is typically some value to replication in science, although after the point where a point is established, it seems more to continue to produce papers than to produce new scientific breakthroughs.

The educational systems in many other countries place great emphasis on instruction and assessments that tap into two important skills: memory and, to a lesser extent, analysis. Students who are adept at these two skills tend to profit from the educational system, because the ability tests, instruction, and achievement tests we use all largely measure products and processes emanating from these two kinds of skills. There is a problem, however, namely, that children whose strengths are in other kinds of skills may be shortchanged by this system. These children might learn and test well, if only they were given an opportunity to play to their strengths rather than their weaknesses.

Our societies can create closed systems that advantage only certain types of children and that disadvantage other types. Children who excel in memory and analytical abilities may end up doing well on ability tests and achievement tests, and hence find the doors of opportunity open to them. Children who excel in other abilities may end up doing poorly on the tests, and find the doors shut. By treating children with alternative patterns of abilities as losers, we may end up creating harmful self-fulfilling prophecies. That is one thing no society needs. What societies need is a broader conception of intelligence. The theory of successful intelligence provides one such conception.

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